Fact Sheet:

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(FL 18)

GAS PIPE MANAGEMENT SYSTEM (GPIPER)

The Problem

Corrosion-induced leaks of underground steel pipelines used to transport and distribute natural gas on Army installations often result in property and environmental damage, safety hazards, and the loss of valuable resources. The corrosion status of underground gas distribution pipes is difficult to assess. Unprotected pipes can leak in as little as two or three years in severely corrosive soils. Not knowing the corrosion status of the gas distribution system inhibits the ability of the Directorate of Public Works (DPW) to perform cost-effective maintenance. Often, corrective action is taken only after a failure has occurred. Corrective measures may include the addition of cathodic protection, repair of existing but malfunctioning cathodic protection, replacement with steel or plastic, or sliplining. DPWs need a tool to assist installations in forecasting the corrosion status of underground gas pipes so that they can prioritize maintenance and repair projects.

The Technology

The U.S. Army Construction Engineering Research Laboratories (CERL) has developed the Gas PIPER (GPIPER) computer program to assist Army installations in prioritizing sections of the gas distribution system for maintenance and repair. Information about the pipes, the soil in which they are buried, and the existence of a functioning cathodic protection system is entered into the GPIPER

data base. Based upon this information, the corrosion status is predicted, including an approximate year of first leak and number of leaks per year that can be expected to occur. The corrosion status index (CSI) is computed from a mathematical model of underground corrosion of steel. The CSI considers pipe wall thickness and properties of the soil surrounding the pipe, including resistivity and pH. With this information, facility engineers can prioritize the allocation of maintenance dollars and forecast future maintenance needs.

Benefits/Savings

The chief benefit of GPIPER is that it increases the reliability and safety of gas piping systems through its prediction of corrosion problems. It provides a basis for prioritizing sections of the gas distribution system for detailed inspection and/or maintenance, thus leading to more effective allocation of maintenance and repair dollars. In addition, the data organization and report generation capabilities will improve the quality of information maintained on underground gas piping.

Status

GPIPER has been demonstrated at Fort Hood, TX, and Fort Riley, KS. GPIPER was also used at Fort Jackson, SC, to assist in prioritizing sections of the gas distribution system for replacement with plastic pipe or for installation of cathodic protection. Aberdeen Proving Ground, MD, and Fort Meade, MD, are using the program to help prioritize sections of the distribution system for repair. The program and two user manuals are currently available. The user manuals are Technical Report FM-92/04, MicroGPIPER Implementation Guide, July 1992, and Automatic Data Processing Report M-91/11, MicroGPIPER User's Manual, May 1991. The Fort Jackson study is described in Technical Report FM-93/07, Corrosion Assessment of an Army Installation Gas Distribution System Using MicroGPIPER. Ongoing work on gas distribution system condition assessment techniques and failure modes is being conducted as part of the Utilities EMS research.

Points of Contact

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